



2004 SIP Summit

Passenger Vehicles

January 13, 2004

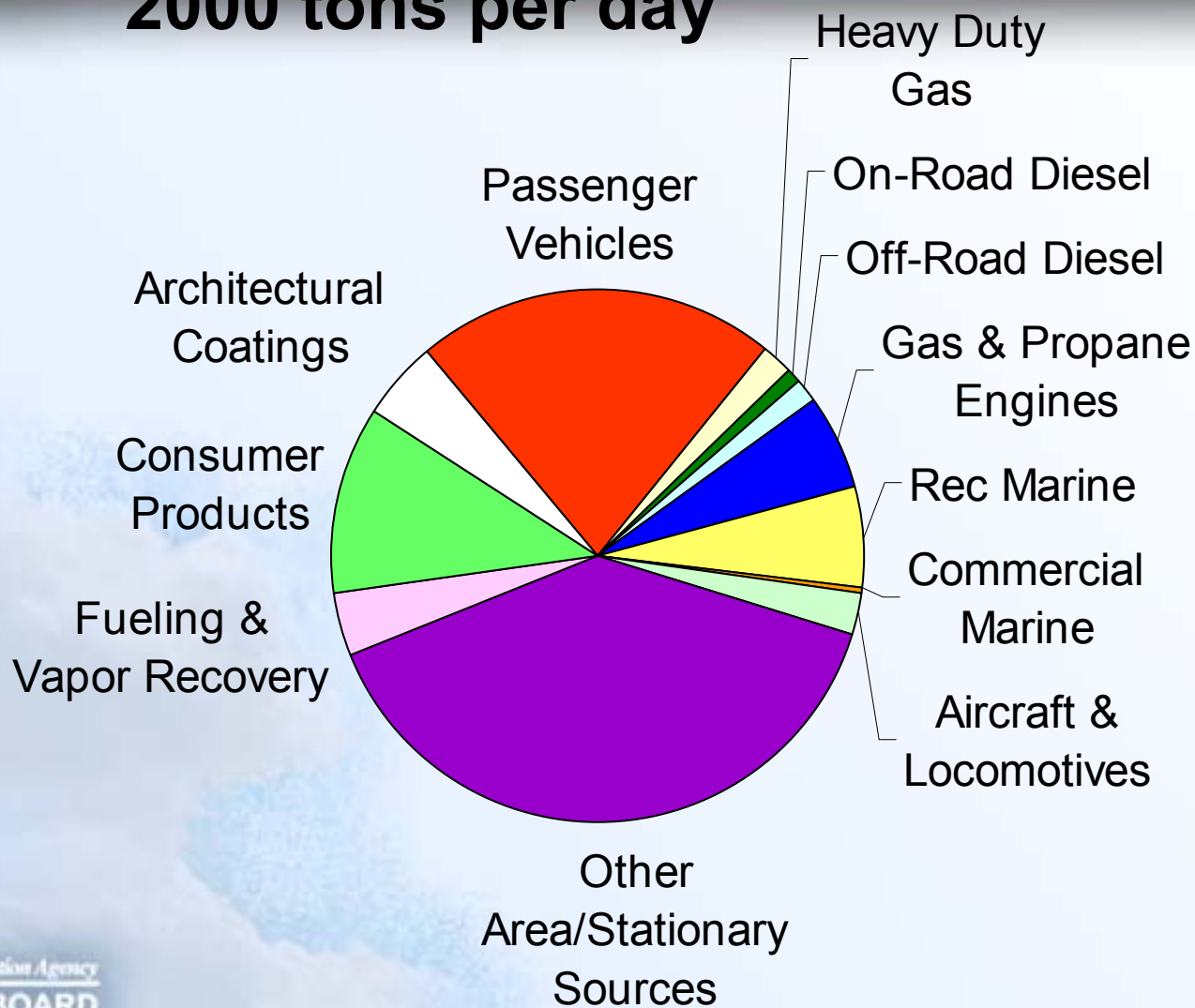
Outline

- Background
- Existing measures
- Emission inventory
- SIP strategies
- Other possible measures

Statewide Emission Sources

ROG Emissions -2010

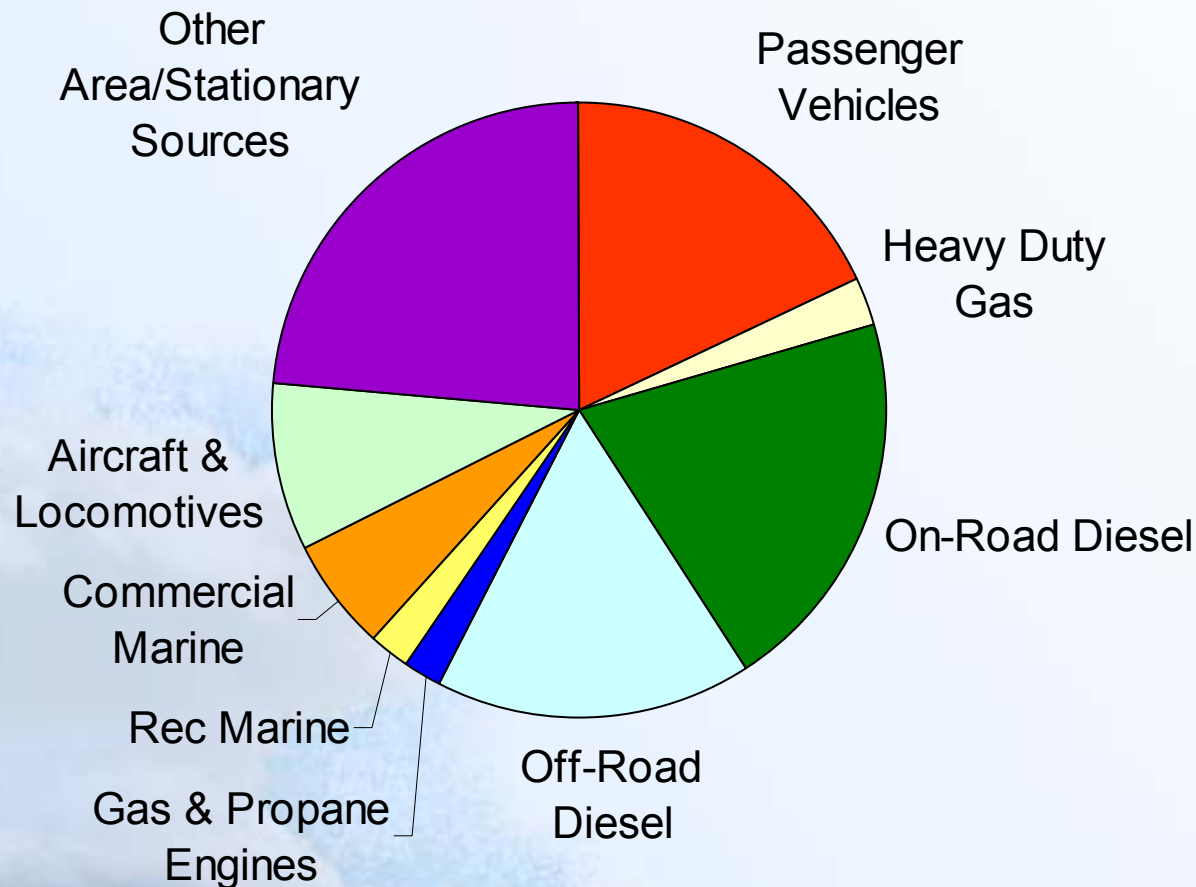
2000 tons per day



Statewide Emission Sources

NOx Emissions - 2010

2300 tons per day



What is a “Passenger Vehicle”?

- Vehicles below 8,500 lbs. gross vehicle weight (GVW)
 - automobiles
 - light trucks, SUVs, minivans

Existing Emissions Controls

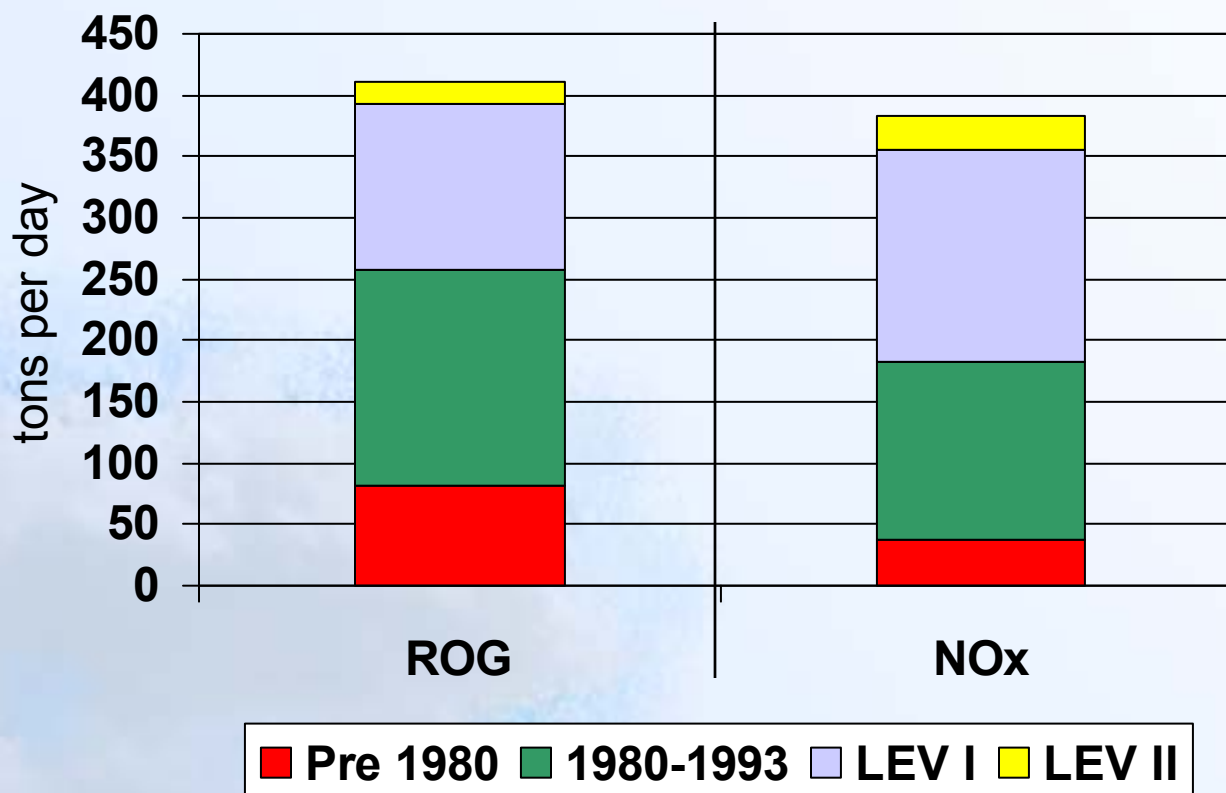
- Low-Emission Vehicle (LEV) program
 - LEV I and LEV II
- Zero-Emission Vehicle (ZEV) Program
 - Partial Zero-Emission Vehicles (PZEVs),
Advanced Technology-PZEVs (AT-PZEVs), ZEVs
- On-Board Diagnostics (OBD II)
- Smog Check
- Motorcycle emission standards
- Cleaner gasoline

The Vehicle Fleet

- Pre 1980
 - 2-way oxidation catalyst (HC/CO)
- 1980 - 1993
 - 3-way catalyst (HC/CO/NO_x)
 - O₂ sensor, on-board computer, fuel injection
- LEV I 1994-2003
 - OBD II, refined catalysts & electronic controls
- LEV II 2004-2010
 - advanced light-off catalysts, precision fuel control

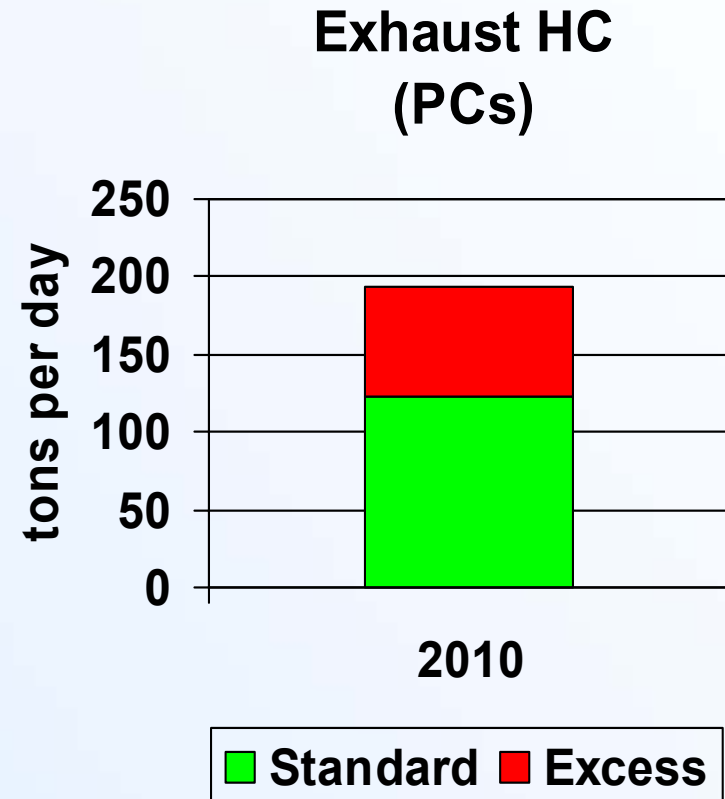
How Important Are Older Cars?

(statewide emissions - 2010)

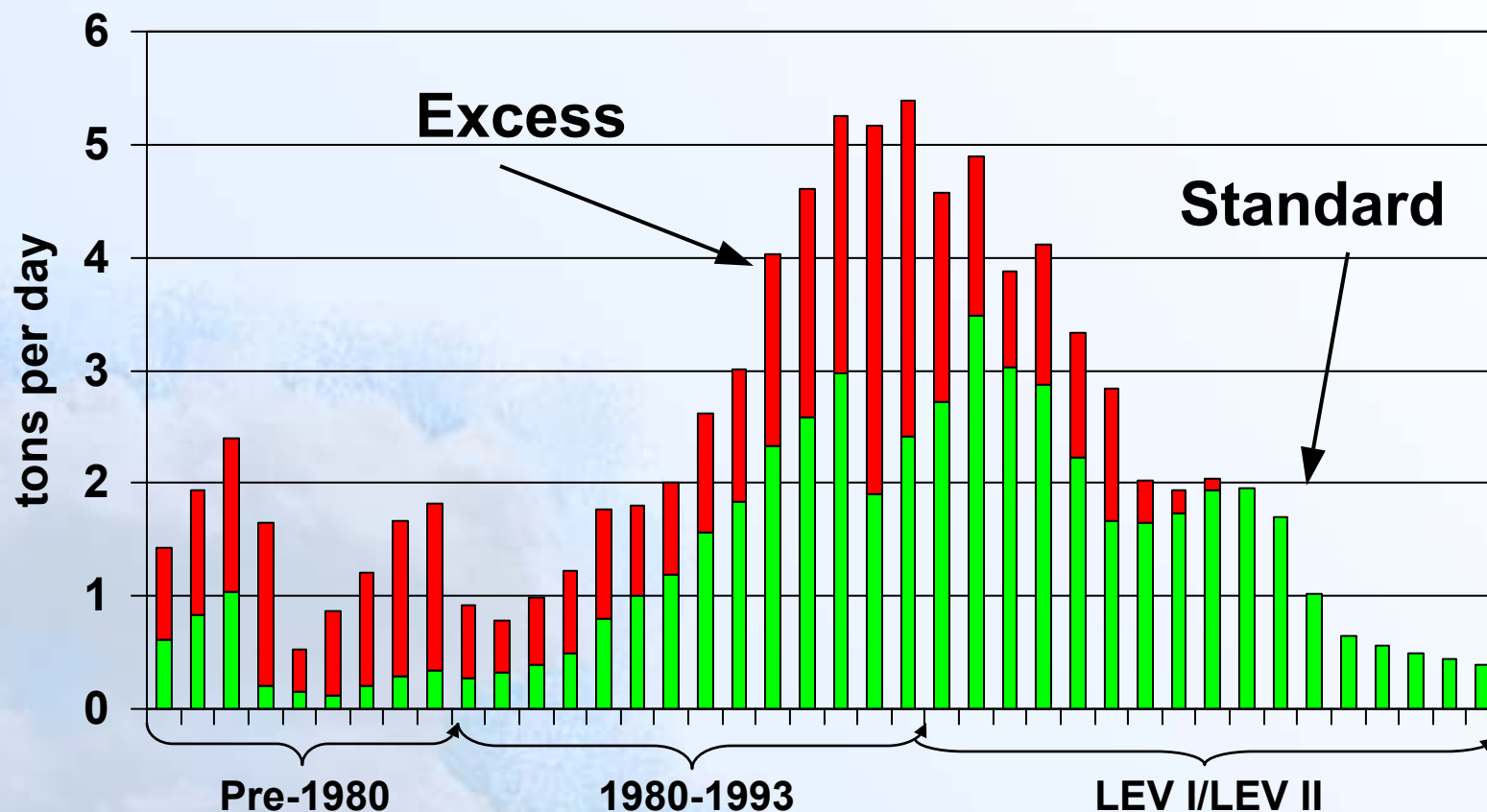


How Important Are Gross Emitters?

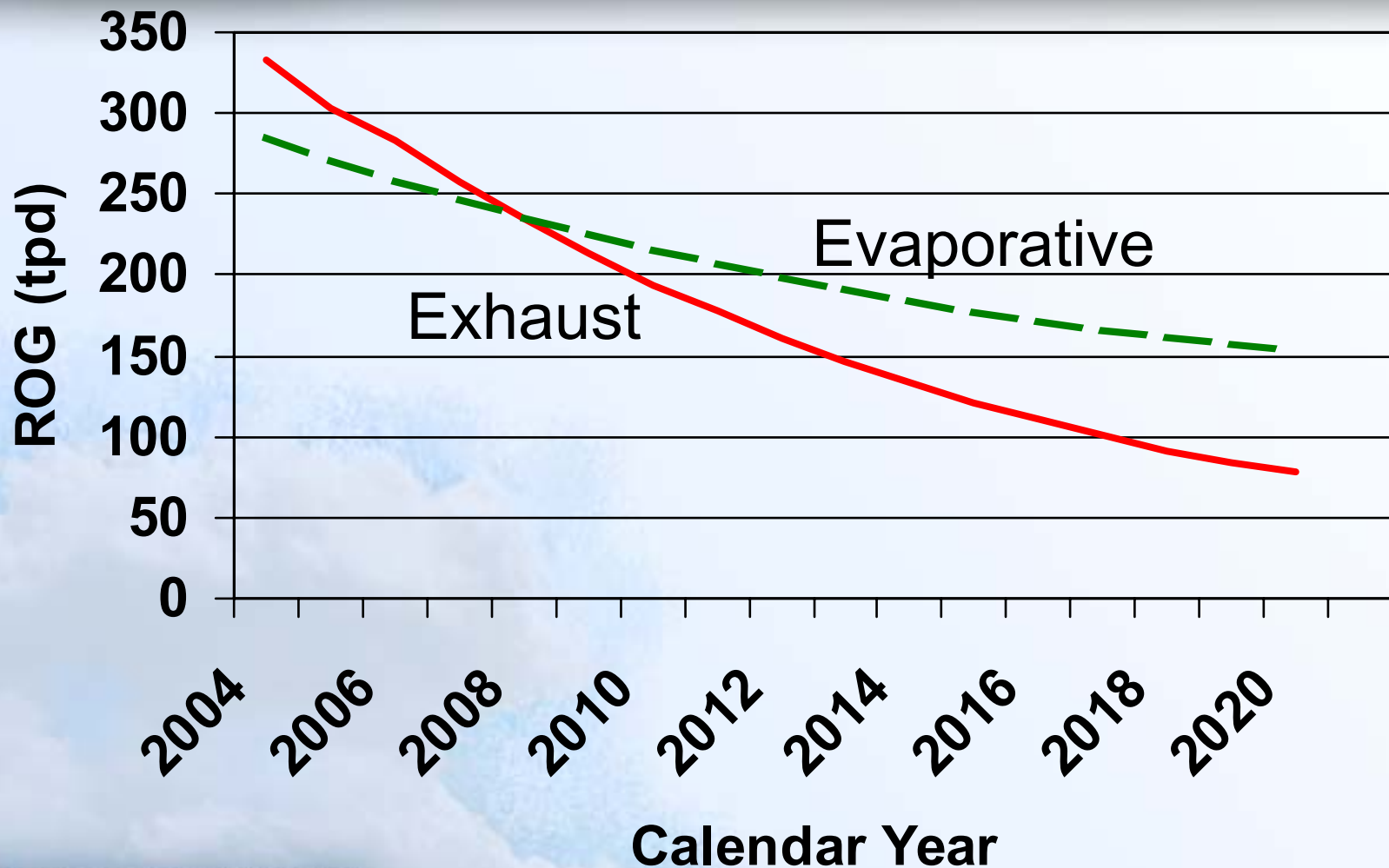
- **Approximately one third of statewide HC emissions in 2010 are excess emissions from vehicles emitting above the standard.**



HC Excess Emissions Statewide - 2010



How Important Are Evaporative Emissions?

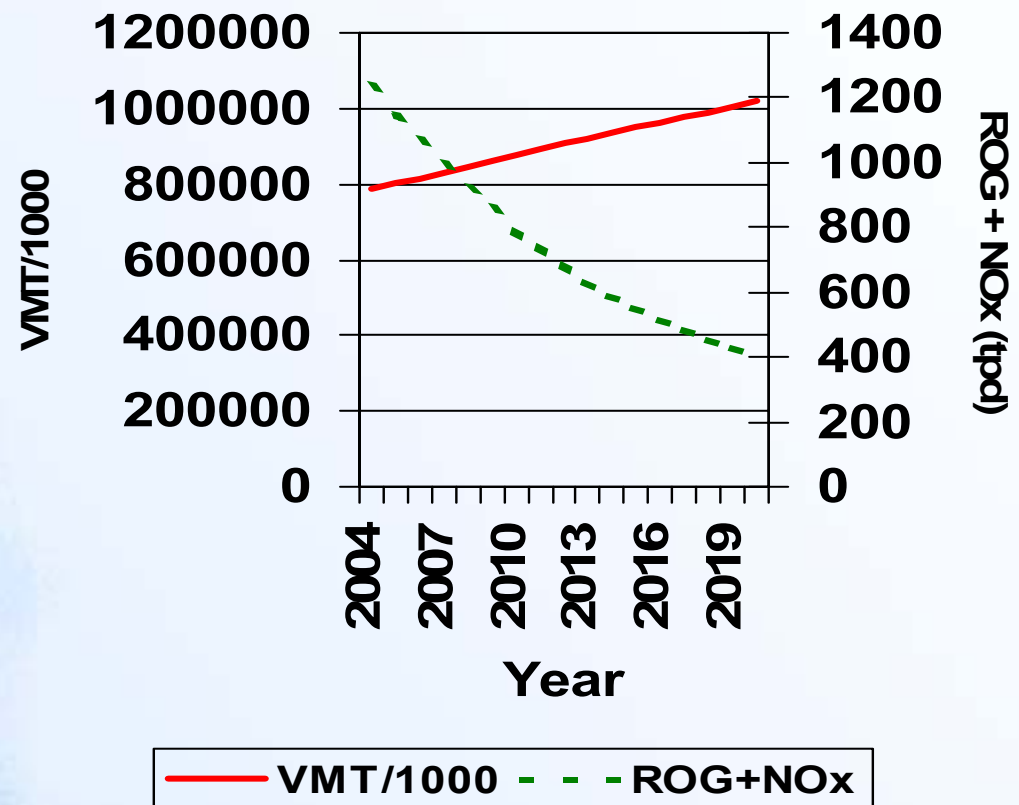


Are SUVs the Problem?

- Traditionally met higher standards
- Contribution will diminish since SUVs and large trucks must meet passenger car standards by 2007
- Will continue to emit higher CO₂

VMT Growth is Important

- 2010
 - VMT increases by 12%
 - Emissions decrease by 36%
- 2020
 - VMT increases by 30%
 - Emissions decrease by 67%



Summary

- New cars in 2010 will be extremely clean
- Advancing introduction of new emission control technology is unlikely by 2010
- Old cars are still a significant contributor to air pollution in 2010

SIP Strategies

Identified SIP Measures In-Use Vehicles

- Parts replacement program
- Improve Smog Check

Emission Component Replacement Program for Light-Duty Vehicles

Emission Control Component Replacement

- Question: Can replacement of critical emission controls on older cars reduce emissions?
- Critical emission controls
 - Catalytic converter, O2 sensor
 - Evaporative canister, hoses

The Vehicle Fleet

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Component Replacement Test Program

- ARB invested considerable effort in test program
 - recently completed at ARB test facility
- Vehicle pass I/M before component replacement
 - repaired within I/M cost limits if necessary
- 1980-1994 MY vehicles tested
 - random selection
 - O₂ sensor and catalyst replacement - 38 vehicles
 - canister replacement - 34 vehicles

Component Replacement Initial Emission Reductions

- O2 Sensor
 - HC 7%, CO 8%, NOx 10%
- Catalyst
 - aftermarket
 - HC 33%, CO 34%, NOx 35%
 - aftermarket OBD II compliant (3 vehs)
 - HC 68%, CO 60%, NOx 35%
 - OEM
 - HC 60%, CO 56%, NOx 65%
- Evaporative Canister
 - diurnal 30%, hot soak 10%

Component Replacement Recaptured Emission Reductions

- Average mileage accumulated ~7,000
- Initial benefits from aftermarket catalysts reduced substantially
- OEM catalysts performed better

Component Replacement Cost (includes labor)

- O2 Sensor
 - \$57-183
- Catalyst
 - aftermarket \$127-355
 - OBD II aftermarket between regular aftermarket and OEM
 - OEM \$327-1,089
- Evaporative Canister
 - \$110-370

Component Replacement Benefit - 2010

- South Coast
 - ROG 0-19 tpd
 - NOx 0-18 tpd
- San Joaquin Valley
 - ROG 0-2.4 tpd
 - NOx 0-2.7 tpd

Summary

- Component replacement program can further reduce in-use emissions in 2010 if it can be implemented.
- Testing to evaluate effectiveness of aftermarket OBD II compliant catalysts ongoing

Other Possible Strategies

- Light-duty scrap
- Additional Smog Check improvements

Light-Duty Scrap

What Is Scrap?

- Accelerates voluntary retirement of older, higher-emitting cars
- Speeds up turnover to more modern, durable emission control equipment

Does Scrap Clean The Air?

Yes

But there are issues:

- Funding
- Emission benefits
- Replacement transportation
- Car collector concerns

Light-Duty Scrap Programs

Issues

- Funding
 - Dependable source of funding needed to enable large-scale program
 - Current programs funded by local air districts
- Emission benefits
 - Must make assumptions about emission rate and remaining vehicle life

Light-Duty Scrap Programs

Issues (continued)

- Replacement transportation
 - Need to ensure mobility for motorists who scrap their cars
 - Importation of cars from other states negates benefit
- Car collector concerns
 - Must preserve car collector ability to obtain valuable cars and car parts

Future Scrap Programs

- \$500 million program can generate 15-20 tons per day of ROG+NOx reductions
 - Equivalent to retiring 10% to 15% of pre-1996 vehicles over life of the program
 - Assumes pre-1996 vehicles are replaced with fleet average vehicle

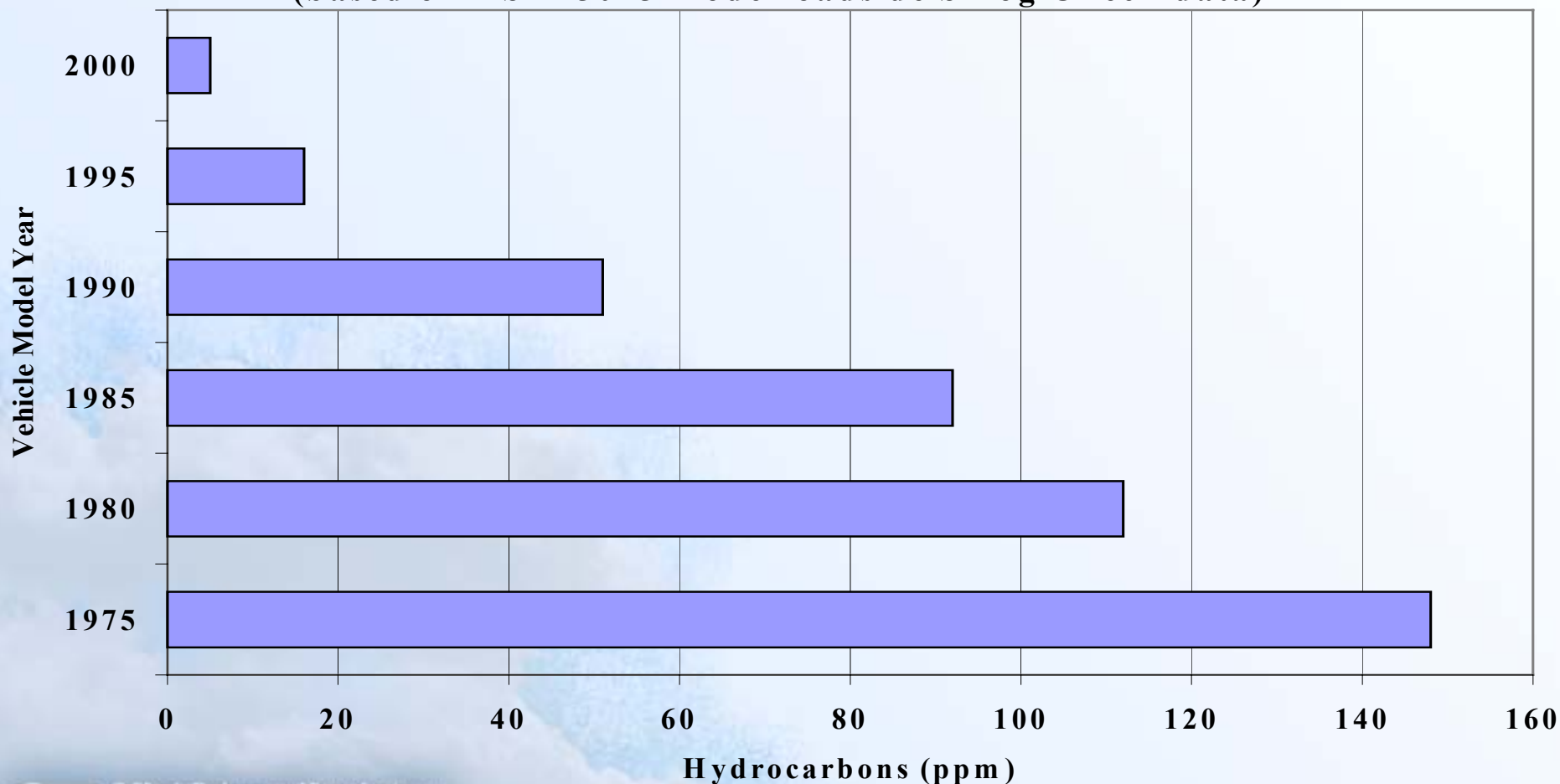
Smog Check

What Is Smog Check?

- Ensures cars stay clean as they age
- Requires biennial inspection for vehicles between 4 and 30 years old
- Applies to cars, pick-up trucks, SUVs, and gasoline-powered delivery vehicles
- Provides 370 tpd of ROG+NO_x reductions statewide

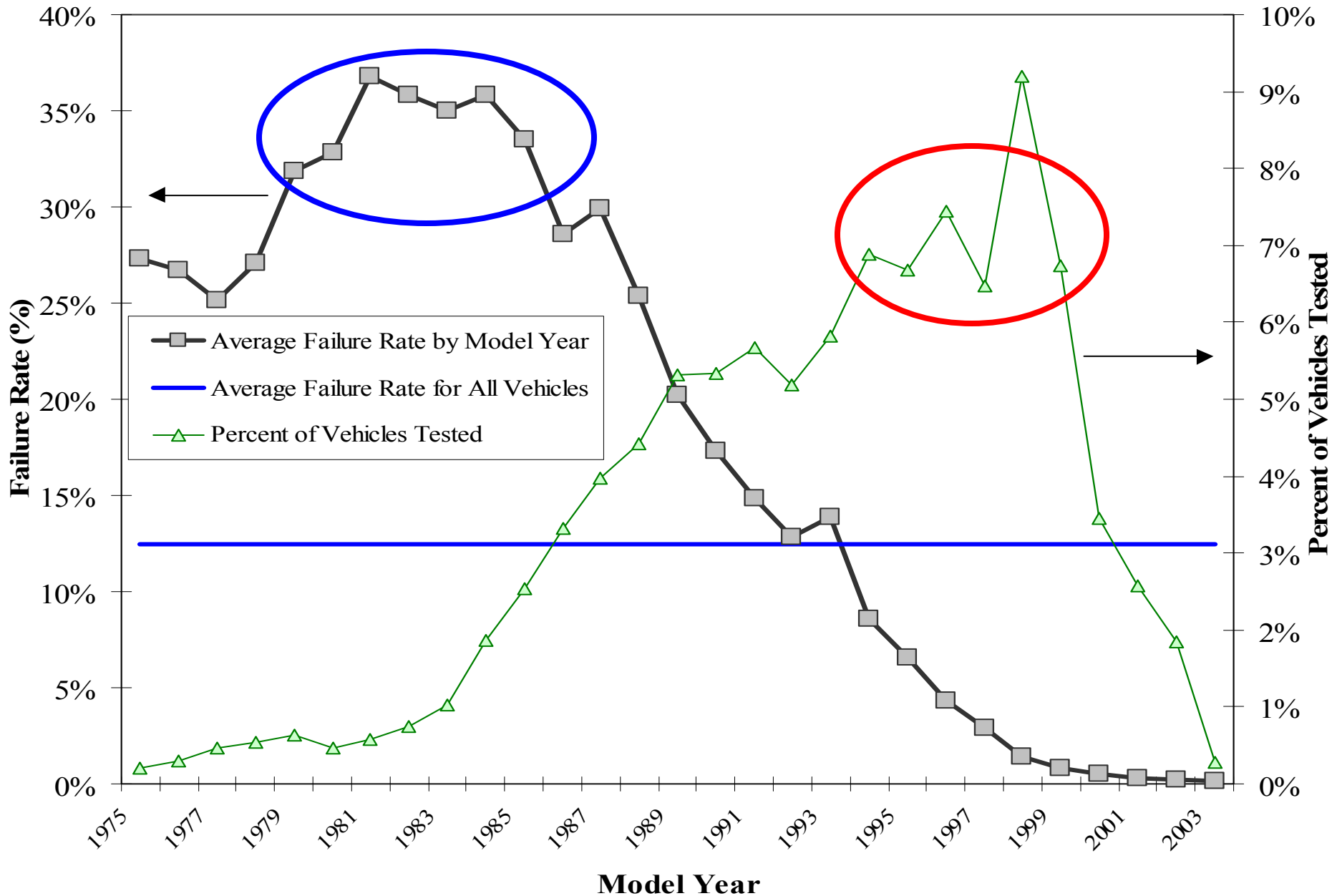
Older Cars Emit More Pollution

Comparison of Fleet Average Hydrocarbons Emissions by Model Year
(based on ASM 5015 mode roadside Smog Check data)



ASM Emission Failure Rates by Model Year

12 Month Average (May 2002-April 2003)



Smog Check

Potential Improvements

- Eliminate 30-year rolling exemption
 - Freeze exemption at pre-1975 vehicles
 - 6 TPD of ROG+NO_x benefits in 2010
- Annual testing of older vehicles
 - Failure rates of 15 year and older vehicles are two to three times the fleet average
 - 25 TPD of ROG+NO_x benefits in 2010

Smog Check

Potential Improvements (continued)

- Annual testing of high mileage vehicles
 - Taxicab testing showed high failure rates
 - Up to 3% of cars driven >25K miles/year
 - up to 20 TPD of ROG+NO_x benefits in 2010

Smog Check

Potential Improvements (continued)

- More stringent cutpoints for after repair tests
 - Roadside data indicates repairs are not as durable as they should be
 - Setting more stringent post-repair cutpoints could encourage vehicles to be fully repaired
 - Emission benefits depend upon post-repair cutpoints

Smog Check

Potential Improvements

- Require dynamometer testing for all-wheel drive vehicles
- Add motorcycles and/or diesel vehicles

Smog Check

Potential Improvements

- Incorporate remote sensing
 - Promising way to identify very dirty and clean cars
 - Pilot program to assess how best to supplement Smog Check program
 - Need to resolve technical concerns

Summary

Passenger Vehicles

- New passenger vehicles emit extremely low levels of pollution
- Reducing emissions from in-use vehicles is key:
 - Parts replacement is promising
 - Large-scale scrap program requires funding
 - Smog Check improvements can increase emission benefits